

09774635

15

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

REC'D 25 OCT 2000

WIPO

PCT

(PCT Article 36 and Rule 70)

| | | |
|--|---|---|
| Applicant's or agent's file reference MPI-106107-0 | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) | |
| International application No. PCT/US99/09541 | International filing date (day/month/year) 30 APRIL 1999 | Priority date (day/month/year) 01 MAY 1998 |
| International Patent Classification (IPC) or national classification and IPC Please See Supplemental Sheet. | | |
| Applicant DJ PARKER COMPANY, INC. | | |

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets.

This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 6 sheets.

3. This report contains indications relating to the following items:

- I Basis of the report
- II Priority
- III Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV Lack of unity of invention
- V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI Certain documents cited
- VII Certain defects in the international application
- VIII Certain observations on the international application

| | |
|--|--|
| Date of submission of the demand 01 DECEMBER 1999 | Date of completion of this report 18 SEPTEMBER 2000 |
| Name and mailing address of the IPEA US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230 | Authorized officer <i>SUSAN OHORODNIK</i> Telephone No. (703) 308-0661 |

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/09541

I. Basis of the report

1. With regard to the elements of the international application:*

 the international application as originally filed the description:pages 1-23, as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____ the claims:pages 24-28, as originally filed
pages NONE, as amended (together with any statement) under Article 19
pages NONE, filed with the demand
pages NONE, filed with the letter of _____ the drawings:pages 1-6, as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____ the sequence listing part of the description:pages NONE, as originally filed
pages NONE, filed with the demand
pages NONE, filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language _____ which is:

the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
 the language of publication of the international application (under Rule 48.3(b)).
 the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

contained in the international application in printed form.
 filed together with the international application in computer readable form.
 furnished subsequently to this Authority in written form.
 furnished subsequently to this Authority in computer readable form.
 The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
 The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

the description, pages NONE
 the claims, Nos. NONE
 the drawings, sheets fig. NONE

5. This report has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c))**

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

**Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/09541

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:
 - restricted the claims.
 - paid additional fees.
 - paid additional fees under protest.
 - neither restricted nor paid additional fees.
2. This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is:
 - complied with.
 - not complied with for the following reasons:

As applicant was previously notified this International Preliminary Examining Authority has found plural inventions claimed in the International Application covered by the claims indicated below:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claim(s) 1-26, drawn to a chemical control system.

Group II, claim(s) 27-34, drawn to precision delivery arrangement.

Group III, claim(s) 35, drawn to pH calibration method.

and it considers that the International Application does not comply with the requirements of unity of invention (Rules 13.1, 13.2 and 13.3) for the reasons indicated below:

The inventions listed as Groups I-III do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Group III lacks a corresponding special technical feature with Groups I and II. The pH calibration method does not require any of the features of Groups I and II.

Group II, claims 27-34 do not make a contribution over the prior art as shown by U.S. Patent No. 5,248,577. Therefore, holding of lack of unity is deemed proper.

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- all parts.
- the parts relating to claims Nos. ____.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/09541

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**1. statement**

| | | | |
|-------------------------------|--------|--------------------|-----|
| Novelty (N) | Claims | <u>1-26, 28-35</u> | YES |
| | Claims | <u>27</u> | NO |
| Inventive Step (IS) | Claims | <u>1-26</u> | YES |
| | Claims | <u>27-35</u> | NO |
| Industrial Applicability (IA) | Claims | <u>1-35</u> | YES |
| | Claims | <u>NONE</u> | NO |

2. citations and explanations (Rule 70.7)

Claims 1-26 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest a chemical control system having a mix container, a hold container, a precision delivery arrangement for delivering plating solution to the mix and hold container, a transfer pump between the mix and hold containers and a nitrogen gas source.

Claim 27 lacks novelty under PCT Article 33(2) as being anticipated by Porter (US 3,887,110 A).

Porter discloses a precision delivery arrangement (figure 2) for chemicals comprised of a pneumatic pump (25), orifice couples to the pump (24) and a flow meter coupled to the orifice (41). Instant claim 27 reads on the apparatus of Porter.

Claims 28-34 lack an inventive step under PCT Article 33(3) as being obvious over Porter (US 3,887,110 A).

With respect to claim 28, Porter discloses a positive displacement pump, but does not explicitly disclose a double diaphragm pump. The use of double diaphragm pump for chemical pumping is well known in the art. It would have been obvious to one skilled in the art at the time of invention to substitute the pump of Porter with a double diaphragm pump, as a obvious matter of engineering design choice involving a mere substitute of equivalent structures (i.e., positive displacement pumps).

With respect to claims 29 and 30, Porter discloses that the pump can be operated at low flow rates, including drops (column 6, lines 8-13), but does not explicitly disclose the flow rates as recited in the instant claim. However, it would have been obvious to one skilled in the art at the time of invention that the pump would be capable of delivering in the recited flow rates, since it is capable of delivering very small quantities, including dropwise quantities.

With respect to claims 31 and 32, the instant claim does not require any structure that significantly differs from the apparatus of Porter as discussed above. It is noted that the rated flow rate of the pump is an operational parameter and does not affect the patentability of the instant invention.

With respect to claims 33 and 34, Porter does not explicitly (Continued on Supplemental Sheet.)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/09541

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 1, 32 and 35 are objected to under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 6 because the claims are indefinite for the following reason(s):

With respect to claim 1, line 7, the term "precise" is vague and indefinite. The disclosure does not define the meaning of "precise." On line 8, it is not clear what is being recited by "selectable combination." A combination refers to two or more elements. The instant claim only has two elements (i.e. the mix and hold container) and, therefore, only one combination is possible.

With respect to claim 32, line 1, the "said source pump" lacks clear antecedent basis.

With respect to claim 35, the method is missing essential steps. The method has the step of taking a calibration reading of the calibration sample, but does not include the step of correcting or comparing the reading to the standard value. Also, the off-line pH sensor is immersed into the chemical sample, however, the method is not clear on how this is performed. If the sample is removed from the sample stream, than the sample is no longer an accurate reflection of the process stream. It is essential that the pH sensor is placed into the flowing process stream in the vicinity of the on-line pH sensor in order to accurately calibrate the on-line pH sensor.

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US99/09541

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

Sheet 10

CLASSIFICATION:

The International Patent Classification (IPC) and/or the National classification are as listed below:
IPC(7): G01N 27/26; G05D 7/06 ; C25D 21/14 and US Cl.: 422/110, 82.03, 62; 73/1.02, 1.03; 222/71, 72

I. BASIS OF REPORT:

5. (Some) amendments are considered to go beyond the disclosure as filed:
NONE

V. 2. REASoNED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):

disclose the orifice internal diameter. However, it would have been obvious to one skilled in the art at the time of invention to vary the orifice diameter according to the fluid flow rates required by the process. The change in size of a component is an obvious matter of engineering design choice.

Claim 35 lacks an inventive step under PCT Article 33(3) as being obvious over Burrell et al (US 3,602,033) and Chevallet et al (US 5,342,527).

The calibration of pH sensors is well known in the art, including both on-line and off-line. Typical on-line calibration of pH sensors involves flowing a calibration solution pass the sensor. Burrell and Chevallet both teach calibrating on-line sensors using an equivalent calibrated off-line sensor. It would have been obvious to one skilled in the art at the time of invention to use the sensor calibration methods of Burrell or Chevallet for the on-line calibration of a pH sensor.

----- NEW CITATIONS -----

US 5,352,350 A (ANDRICACOS et al) 04 OCTOBER 1994, Figure 2.

US 5,510018 A (REY) 23 APRIL 1996, entire document.

US 3,887,110 A (PORTER) 03 JUNE 1975, see Figures 3 and 5 and column 5, line 40 to column 6, line 47.

US 3,602,033 A (BURRELL et al) 31 AUGUST 1971, entire document.

US 5,342,527 A (CHEVALLET et al) 30 AUGUST 1994, entire document.

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C. 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

| | |
|---|---|
| Date of mailing (day/month/year) 08 March 2000 (08.03.00) | in its capacity as elected Office |
| International application No. PCT/US99/09541 | Applicant's or agent's file reference MPI-106107-0 |
| International filing date (day/month/year) 30 April 1999 (30.04.99) | Priority date (day/month/year) 01 May 1998 (01.05.98) |
| Applicant | |
| BALISKY, Todd, Alan | |

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

01 December 1999 (01.12.99)

in a notice effecting later election filed with the International Bureau on:

2. The election was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

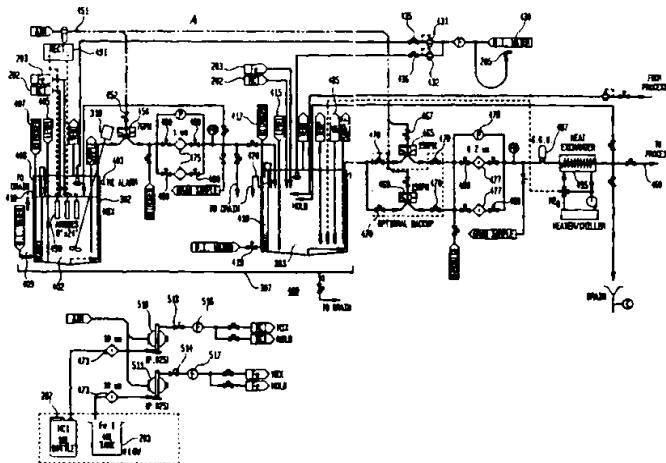
| | |
|---|---|
| <p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p> | <p>Authorized officer</p> <p>S. Mafla</p> <p>Telephone No.: (41-22) 338.83.38</p> |
|---|---|



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

| | | |
|---|---|--|
| (51) International Patent Classification ⁶ : | A2 | (11) International Publication Number: WO 99/57340 |
| C25D | | (43) International Publication Date: 11 November 1999 (11.11.99) |
| | | |
| (21) International Application Number: | PCT/US99/09541 | |
| (22) International Filing Date: | 30 April 1999 (30.04.99) | |
| (30) Priority Data: | 60/083,811 1 May 1998 (01.05.98) US 60/083,811 (CIP) Filed on 1 May 1998 (01.05.98) | |
| (63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Application | | |
| US | 60/083,811 (CIP) | |
| Filed on | 1 May 1998 (01.05.98) | |
| (71) Applicant (for all designated States except US): | DJ PARKER COMPANY, INC. [US/US]; doing business as Parker Systems, 2821 E. Philadelphia Avenue - D, Ontario, CA 91761 (US). | |
| (72) Inventor; and | | |
| (75) Inventor/Applicant (for US only): | BALISKY, Todd, Alan [US/US]; Parker Systems, 2821 E. Philadelphia Avenue -- D, Ontario, CA 91761 (US). | |
| (74) Agents: | ROHM, Benita, J. et al.; Rohm & Monsanto, P.L.C., Suite 1525, 660 Woodward Avenue, Detroit, MI 48226 (US). | |

(54) Title: CHEMICAL MIXING, REPLENISHMENT, AND WASTE MANAGEMENT SYSTEM



(57) Abstract

A chemical control system for controlling the chemistry of a chemical solution having predetermined chemical constituents in a plating system, such as a NiFe plating system, employs a mix container for containing a plating solution and a hold container for containing a plating solution delivered from the mix container. A precision delivery arrangement delivers a precise predetermined quantum of a predetermined constituent of the plating solution to multiple mix containers and the hold containers. Transfer of plating solution between the mix and hold containers is effected by a transfer pump. Nitrogen gas that has been humidified with deionized water protects the plating solution from either acquiring water or becoming dehydrated, the humidified nitrogen gas being humidified to a predetermined relative humidity with respect to the temperature of the plating solution in the mix container. This is achieved by urging the nitrogen gas through a column that is at the same temperature as the plating solution. Precise delivery of the chemical constituents is achieved by a pneumatic pump arranged serially with an orifice and an inexpensive flow meter. The pneumatic pump is a positive displacement, double diaphragm pump.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

| | | | | | | | |
|----|--------------------------|----|---------------------------------------|----|---|----|--------------------------|
| AL | Albania | ES | Spain | LS | Lesotho | SI | Slovenia |
| AM | Armenia | FI | Finland | LT | Lithuania | SK | Slovakia |
| AT | Austria | FR | France | LU | Luxembourg | SN | Senegal |
| AU | Australia | GA | Gabon | LV | Latvia | SZ | Swaziland |
| AZ | Azerbaijan | GB | United Kingdom | MC | Monaco | TD | Chad |
| BA | Bosnia and Herzegovina | GE | Georgia | MD | Republic of Moldova | TG | Togo |
| BB | Barbados | GH | Ghana | MG | Madagascar | TJ | Tajikistan |
| BE | Belgium | GN | Guinea | MK | The former Yugoslav Republic of Macedonia | TM | Turkmenistan |
| BF | Burkina Faso | GR | Greece | ML | Mali | TR | Turkey |
| BG | Bulgaria | HU | Hungary | MN | Mongolia | TT | Trinidad and Tobago |
| BJ | Benin | IE | Ireland | MR | Mauritania | UA | Ukraine |
| BR | Brazil | IL | Israel | MW | Malawi | UG | Uganda |
| BY | Belarus | IS | Iceland | MX | Mexico | US | United States of America |
| CA | Canada | IT | Italy | NE | Niger | UZ | Uzbekistan |
| CF | Central African Republic | JP | Japan | NL | Netherlands | VN | Viet Nam |
| CG | Congo | KE | Kenya | NO | Norway | YU | Yugoslavia |
| CH | Switzerland | KG | Kyrgyzstan | NZ | New Zealand | ZW | Zimbabwe |
| CI | Côte d'Ivoire | KP | Democratic People's Republic of Korea | PL | Poland | | |
| CM | Cameroon | KR | Republic of Korea | PT | Portugal | | |
| CN | China | KZ | Kazakhstan | RO | Romania | | |
| CU | Cuba | LC | Saint Lucia | RU | Russian Federation | | |
| CZ | Czech Republic | LI | Liechtenstein | SD | Sudan | | |
| DE | Germany | LK | Sri Lanka | SE | Sweden | | |
| DK | Denmark | LR | Liberia | SG | Singapore | | |
| EE | Estonia | | | | | | |

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



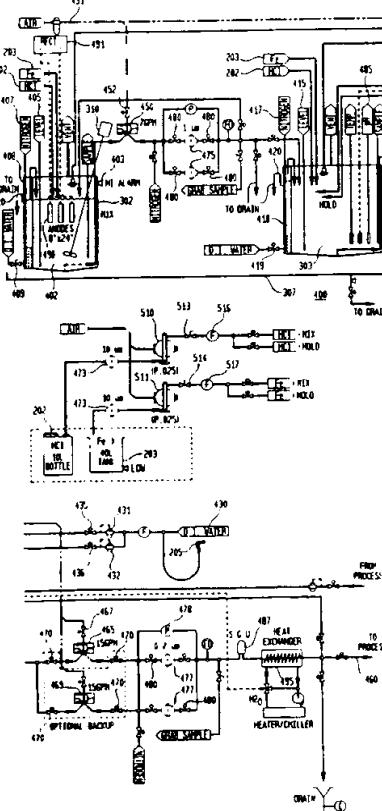
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

| | | |
|---|----|--|
| (51) International Patent Classification ⁶ : | A3 | (11) International Publication Number: WO 99/57340 (43) International Publication Date: 11 November 1999 (11.11.99) |
| (21) International Application Number: PCT/US99/09541 | | (81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). |
| (22) International Filing Date: 30 April 1999 (30.04.99) | | |
| (30) Priority Data: 60/083,811 1 May 1998 (01.05.98) US | | |
| (63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Application US 60/083,811 (CIP) Filed on 1 May 1998 (01.05.98) | | |
| (71) Applicant (for all designated States except US): DJ PARKER COMPANY, INC. [US/US]; doing business as Parker Systems, 2821 E. Philadelphia Avenue - D, Ontario, CA 91761 (US). | | Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> |
| (72) Inventor; and (75) Inventor/Applicant (for US only): BALISKY, Todd, Alan [US/US]; Parker Systems, 2821 E. Philadelphia Avenue - D, Ontario, CA 91761 (US). | | (88) Date of publication of the international search report: 3 February 2000 (03.02.00) |
| (74) Agents: ROHM, Benita, J. et al.; Rohm & Monsanto, P.L.C., Suite 1525, 660 Woodward Avenue, Detroit, MI 48226 (US). | | |

(54) Title: CHEMICAL MIXING, REPLENISHMENT, AND WASTE MANAGEMENT SYSTEM

(57) Abstract

A chemical control system for controlling the chemistry of a chemical solution having predetermined chemical constituents in a plating system, such as a NiFe plating system, employs a mix container for containing a plating solution and a hold container for containing a plating solution delivered from the mix container. A precision delivery arrangement delivers a precise predetermined quantum of a predetermined constituent of the plating solution to multiple mix containers and the hold containers. Transfer of plating solution between the mix and hold containers is effected by a transfer pump. Nitrogen gas that has been humidified with deionized water protects the plating solution from either acquiring water or becoming dehydrated, the humidified nitrogen gas being humidified to a predetermined relative humidity with respect to the temperature of the plating solution in the mix container. This is achieved by urging the nitrogen gas through a column that is at the same temperature as the plating solution. Precise delivery of the chemical constituents is achieved by a pneumatic pump arranged serially with an orifice and an inexpensive flow meter. The pneumatic pump is a positive displacement, double diaphragm pump.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

| | | | | | | | |
|----|--------------------------|----|---------------------------------------|----|---|----|--------------------------|
| AL | Albania | ES | Spain | LS | Lesotho | SI | Slovenia |
| AM | Armenia | FI | Finland | LT | Lithuania | SK | Slovakia |
| AT | Austria | FR | France | LU | Luxembourg | SN | Senegal |
| AU | Australia | GA | Gabon | LV | Larvia | SZ | Swaziland |
| AZ | Azerbaijan | GB | United Kingdom | MC | Monaco | TD | Chad |
| BA | Bosnia and Herzegovina | GE | Georgia | MD | Republic of Moldova | TG | Togo |
| BB | Barbados | GH | Ghana | MG | Madagascar | TJ | Tajikistan |
| BE | Belgium | GN | Guinea | MK | The former Yugoslav Republic of Macedonia | TM | Turkmenistan |
| BF | Burkina Faso | GR | Greece | ML | Mali | TR | Turkey |
| BG | Bulgaria | HU | Hungary | MN | Mongolia | TT | Trinidad and Tobago |
| BJ | Benin | IE | Ireland | MR | Mauritania | UA | Ukraine |
| BR | Brazil | IL | Israel | MW | Malawi | UG | Uganda |
| BY | Belarus | IS | Iceland | MX | Mexico | US | United States of America |
| CA | Canada | IT | Italy | NE | Niger | UZ | Uzbekistan |
| CF | Central African Republic | JP | Japan | NL | Netherlands | VN | Viet Nam |
| CG | Congo | KE | Kenya | NO | Norway | YU | Yugoslavia |
| CH | Switzerland | KG | Kyrgyzstan | NZ | New Zealand | ZW | Zimbabwe |
| CI | Côte d'Ivoire | KP | Democratic People's Republic of Korea | PL | Poland | | |
| CM | Cameroon | KR | Republic of Korea | PT | Portugal | | |
| CN | China | KZ | Kazakstan | RO | Romania | | |
| CU | Cuba | LC | Saint Lucia | RU | Russian Federation | | |
| CZ | Czech Republic | LJ | Liechtenstein | SD | Sudan | | |
| DE | Germany | LK | Sri Lanka | SE | Sweden | | |
| DK | Denmark | LR | Liberia | SG | Singapore | | |
| EE | Estonia | | | | | | |

01.27.98

L-R

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| | | |
|---|---|--|
| Applicant's or agent's file reference MP I-106107-0 | FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below. | |
| International application No. PCT/US 99/ 09541 | International filing date (day/month/year) 30/04/1999 | (Earliest) Priority Date (day/month/year) 01/05/1998 |
| Applicant DJ PARKER COMPANY, INC. et al. | | |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. Certain claims were found unsearchable (See Box I).

3. Unity of invention is lacking (see Box II).

4. With regard to the **title**,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

as suggested by the applicant.

because the applicant failed to suggest a figure.

because this figure better characterizes the invention.

6

None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/09541

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 C25D21/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 C25D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|----------|--|-----------------------|
| A | FR 2 097 039 A (NICKEL LE) 3 March 1972 (1972-03-03) ---- | |
| A | US 5 368 715 A (HURLEY MICHAEL P ET AL) 29 November 1994 (1994-11-29) ---- | |
| A | DE 25 35 608 A (SCHERING AG) 17 February 1977 (1977-02-17) ---- | |
| A | US 4 326 940 A (ECKLES WILLIAM E ET AL) 27 April 1982 (1982-04-27) ---- | |
| A | PATENT ABSTRACTS OF JAPAN vol. 017, no. 146 (C-1039), 24 March 1993 (1993-03-24) & JP 04 314883 A (NIPPON STEEL CORP), 6 November 1992 (1992-11-06) abstract ---- -/- | |

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority, claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

30 November 1999

07/12/1999

Name and mailing address of the ISA

European Patent Office, P B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040. Tx 31 651 epo nl.
Fax: (+31-70) 340-3016

Authorized officer

Van Leeuwen, R

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/09541

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|----------|---|-----------------------|
| A | PATENT ABSTRACTS OF JAPAN vol. 011, no. 214 (C-434), 10 July 1987 (1987-07-10) & JP 62 030898 A (SUMITOMO METAL IND LTD), 9 February 1987 (1987-02-09) abstract --- | |
| A | US 4 102 756 A (CASTELLANI EUGENE EVANS ET AL) 25 July 1978 (1978-07-25) --- | |
| A | EP 0 180 090 A (IBM) 7 May 1986 (1986-05-07) --- | |
| A | DE 44 05 741 C (ATOTECH DEUTSCHLAND GMBH) 1 June 1995 (1995-06-01) ---- | |

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/09541

| Patent document cited in search report | Publication date | Patent family member(s) | | Publication date |
|--|------------------|--|--|--|
| FR 2097039 | A 03-03-1972 | NONE | | |
| US 5368715 | A 29-11-1994 | NONE | | |
| DE 2535608 | A 17-02-1977 | NONE | | |
| US 4326940 | A 27-04-1982 | NONE | | |
| JP 04314883 | A 06-11-1992 | NONE | | |
| JP 62030898 | A 09-02-1987 | NONE | | |
| US 4102756 | A 25-07-1978 | CA 1141695 A CA 1159792 A DE 2758147 A FR 2376229 A GB 1591546 A IT 1114187 B JP 1117259 C JP 53084830 A JP 57009636 B | | 22-02-1983 03-01-1984 13-07-1978 28-07-1978 24-06-1981 27-01-1986 15-10-1982 26-07-1978 22-02-1982 |
| EP 0180090 | A 07-05-1986 | JP 61110799 A | | 29-05-1986 |
| DE 4405741 | C 01-06-1995 | AT 181118 T CA 2179904 A WO 9523247 A DE 59506171 D EP 0746640 A ES 2133751 T JP 9509222 T | | 15-06-1999 31-08-1995 31-08-1995 15-07-1999 11-12-1996 16-09-1999 16-09-1997 |